

What is claimed is:

1. An aeration tine device attached to a soil aerator, comprising:

a tubular tine member extending along an axial direction thereof between a lower end portion and an upper end portion and having a lower opening bored at a center of a lower end surface, and a long side ejection opening in communication with the lower opening, the lower end surface being extending in a plane perpendicular to the axial direction; and

a hard metal tip made of a hard metal material having a tapered distal end portion formed with a tip opening and a proximal end portion formed with a proximal opening bored at a center of a proximal end surface in communication with the tip opening, the proximal end surface extending in a plane perpendicular to the axial direction and coupling in an area contact with the lower end surface of the tubular tine member.

2. The aeration tine device according to claim 1, wherein the proximal end surface has an outer diameter substantially equal to an outer diameter of the lower end of the tubular tine member.

3. The aeration tine device according to claim 1, wherein the hard metal tip has the tip opening whose diameter is narrower than the diameter of the proximal opening.

4. The aeration tine device according to claim 1, wherein the hard metal tip has a frustum portion of a cone shape located on a lower side and a cylindrical portion located on an upper side.

5. The aeration tine device according to claim 1, wherein the hard metal tip and the tubular tine member are connected with each other by brazing.

6. The aeration tine device according to claim 1, wherein the hard metal tip is essentially made of tungsten carbide, titanium carbide, or cermet.

7. The aeration tine device according to claim 1, wherein the tubular tine member is essentially made of carbon steel, alloy steel, stainless steel, or any combination of those steels.

8. An aeration tine device attached to a soil aerator, comprising:

a tubular tine member extending along an axial direction thereof between a lower end portion and an upper end portion and having a lower opening bored at a center of a lower end surface, and a long side ejection opening in communication with the lower opening, the lower end surface being extending in a plane perpendicular to the axial direction;

a hard metal tip made of a hard metal material having a tapered distal end portion formed with a tip opening and a proximal end portion formed with a proximal opening bored at a center of a proximal end surface in communication with the tip opening, the proximal end surface extending in a plane perpendicular to the axial direction and coupling in an area contact with the lower end surface of the tubular tine member; and

a metal foil insertion placed between the lower end surface of the tubular tine member and the proximal end surface of the hard metal tip for connecting the tubular tine member with the hard metal tip by brazing.

9 The aeration tine device according to claim 8, wherein the metal foil insertion is essentially made of copper, and wherein the hard metal tip and the tubular tine member are connected by silver brazing.

10. An aeration tine device attached to a soil aerator, comprising:

a tubular tine member extending along an axial direction thereof between a lower end portion and an upper end portion and having a lower opening bored at a center of a lower end surface, and a long side ejection opening in communication with the lower opening, the lower end surface being extending in a plane perpendicular to the axial direction; the long side ejection opening having a back slope formed in a united body with the tubular tine member rising in a curving manner from an inter surface of the tubular tine member; and

a hard metal tip made of a hard metal material having a tapered distal end portion formed with a tip opening and a proximal end portion formed with a proximal opening bored at a center of a proximal end surface in communication with the tip opening, the proximal end surface extending in a plane perpendicular to the axial direction and coupling in an area contact with the lower end surface of the tubular tine member.

11. The aeration tine device according to claim 10, wherein the inner surface is extending in a cylindrical shape and the back slope is rising from a portion of the inner surface opposite to the long side ejection opening with an angle of 20 to 40 degrees.

12. The aeration tine device according to claim 10, wherein the inner surface is extending in a cylindrical shape and is made wider as coming close to the long side ejection opening.